MT1500A

T1/FT1 CSU/DSU, V.35

User Manual

Customer Support Information

Order toll-free in the U.S.: Call 877-877-BBOX (outside U.S. call 724-746-5500)
FREE technical support 24 hours a day, 7 days a week: Call 724-746-5500 or fax 724-746-0746
Mailing address: Black Box Corporation, 1000 Park Drive, Lawrence, PA 15055-1018
Web site: www.blackbox.com • E-mail: info@blackbox.com

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Federal Communications Commission and Industry Canada Radio Frequency Interference Statements

This equipment generates, uses, and can radiate radio-frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

Instrucciones de Seguridad
(Normas Oficiales Mexicanas Electrical Safety Statement)

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc.
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.
12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objectos liquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
    - A: El cable de poder o el contacto ha sido dañado; u
    - B: Objectos han caído o líquido ha sido derramado dentro del aparato; o
    - C: El aparato ha sido expuesto a la lluvia; o
    - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
    - E: El aparato ha sido tirado o su cubierta ha sido dañada.

T1/FT1 CSU/DSU, V.35 registration number and REN are as follows:

FCC 68 Registration Number: 1U5USA-33109-DE-N
REN: 0.0B

FACILITY INTERFACE CODE FOR DIGITAL SERVICES

CODE	DESCRIPTION
04DU9-BN	1.544 Mbps Superframe Format (SF) without line power.
04DU9-DN	1.544 Mbps SF and B8ZS without line power.
04DU9-1KN	1.544 Mbps ANSI ESF without line power.
04DU9-1SN	1.544 Mbps ANSI ESF and B8ZS without line power.

SERVICE ORDER CODES FOR DIGITAL SERVICES

CODE	DESCRIPTION
6.0N	Does not provide billing and encoded analog protection. Uses either an integrated or external CSU. Affidavit to telco is required.

The T1/FT1 CSU/DSU connects to the network using an RJ-48 connector.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. If advance notice isn't practical, the Telephone Company will notify the customer as soon as possible. Also, you will be advised of your right to file a compliant with the FCC if you believe it is necessary. The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the Telephone Company will provide advance notice in order for you to make the necessary modifications in order to maintain uninterrupted service.

Normally, this equipment will be used in conjunction with FCC registered equipment that limits the Encoded Analog Content and provides the required Billing Protection. If the connected equipment is not of this type, an affidavit must be supplied to the telephone company where the network connection is to be made. The affidavit is to be notarized, and is to be filed at least ten days before the initial connection.

If you have trouble with this equipment, please contact Black Box Tech Support for repair and warranty information. If the trouble is causing harm to the telephone network, the Telephone Company may request you remove the equipment from the network until the problem is resolved.

This equipment cannot be used on telephone company-provided coin service. Connection to Party Line Service is subject to state tariffs.

Black Box Corporation
Phone: 724-746-5500
Email: info@blackbox.com

Safety Requirements

CAUTION:

a. Never install telephone wiring during a lightning storm.

b. Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.

c. Never touch un-insulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.

d. Use caution when installing or modifying telephone lines.

Refer to the installation chapter in this manual for a safe and proper installation procedure. All wiring external to this equipment should follow the current provision of the National Electrical Code.

National Electrical Code Requirements

The T1/FT1 CSU/DSU, including this equipment, is in compliance with CSA NRTLC 1950 Third Edition and as such, UL 1950. The CSA control number for the T1/FT1 CSU/DSU is LR113152.

DOC CS-03 Requirements

NOTICE: The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.
Before installing this equipment, user should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alternations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

User should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: User should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The Load Number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop that is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the Load Number of all the devices does not exceed 100.

Standard Lists

T1/FT1 CSU/DSU is designed to meet the following standards:

- AT&T 62411, AT&T 54016, ANSI T1.403

1.0 Product Description

1.1 Description

The T1/FT1 is a standalone intelligent Fractional T1 Channel Service Unit and Data Service Unit (CSU/DSU). This product family provides a T1 network interface, DS0 channel multiplexing, and direct connections to data and video DTE (Data Terminal Equipment).

Table 1-1. T1 Spartan T1/FT1 CSU/DSU Product Family

Model	NI (Network Interface)	Physical	DTE Port
T1/FT1 CSU/DSU	100 ohm Twisted Pair T1	Stand-Alone – One Port	V.35 / M34 EIA530 / M34

The T1/FT1 CSU/DSU can be configured via the local terminal (RS-232/VT-100) control interface.

1.2 Applications

The T1/FT1 CSU/DSU application examples are illustrated in Figures 1-2 through 1-5. Via DACS (Digital Access Cross-Connect System), the T1/FT1 interfaces various applications such as LAN (Local Area Network) to WAN (Wide Area Network) communications, host to workstation communications, and video conferencing. This allows the user to integrate different applications into a single communication link using only part of the available bandwidth. Furthermore, this allows the user to expand bandwidth, up to 24 DS0 channels, on demand without additional physical links because they are already available. Data and video applications may include equipment such as video conferencing, bridge, router, gateway, workstation, host computer, and various high-speed data terminal equipment.

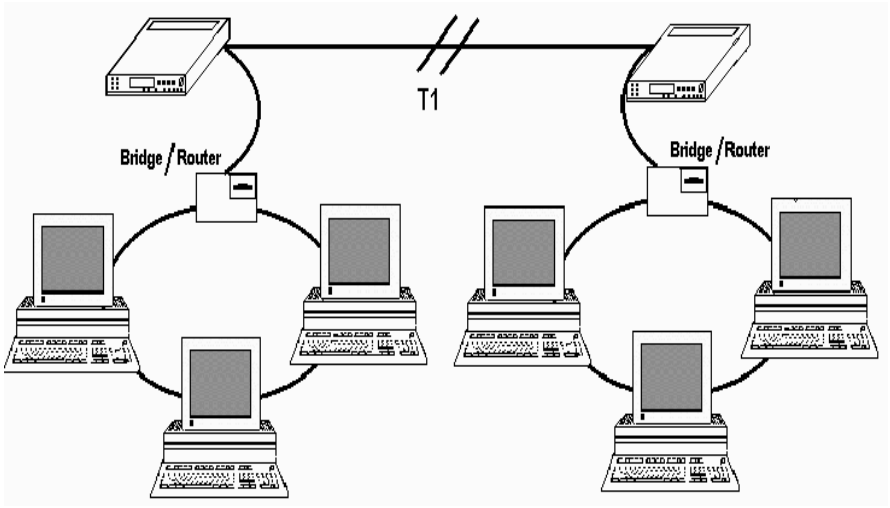


Figure 1-1. Application Illustration -1

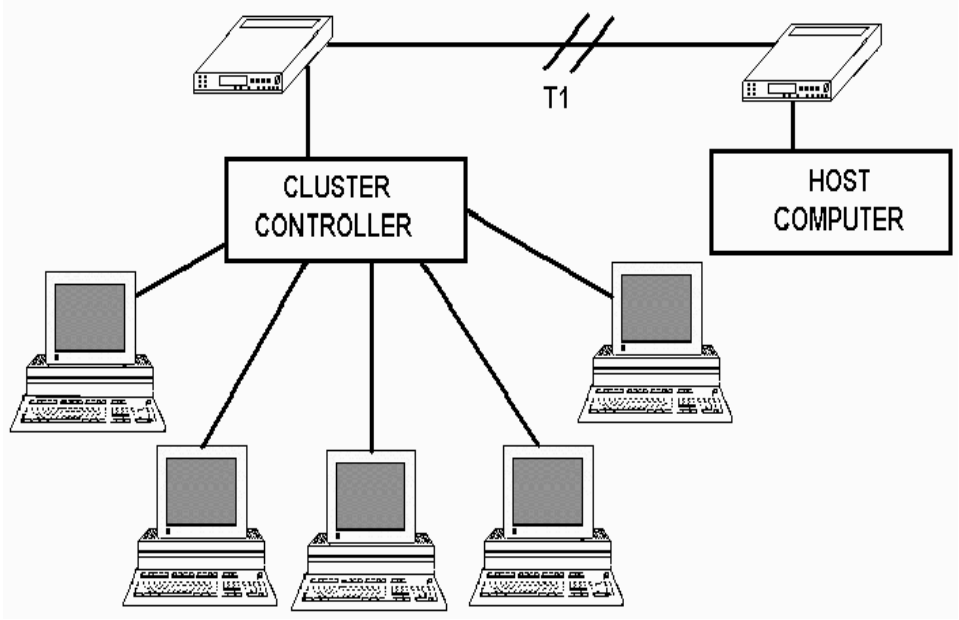


Figure 1-2. Application Illustration -2

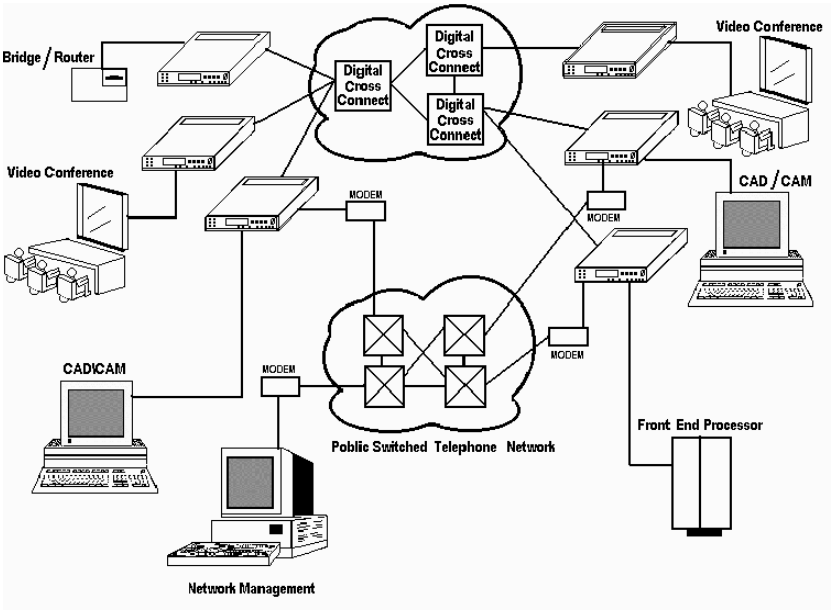


Figure 1-3. Application Illustration -3

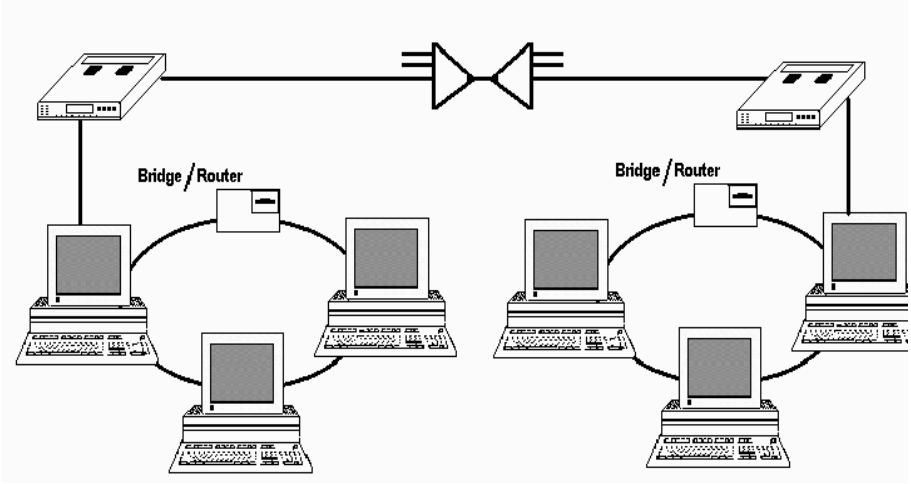


Figure 1-4. Application Illustration -4

2.0 Installation

CAUTION:

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch un-insulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.

2.1 Unpacking

This product is shipped in a complete package, which contains the T1/FT1 CSU/DSU and accessories. Check the shipping material against Table 2-1, Shipping Material List.

Table 2-1. Shipping Material List

Description	Item	Part Number
T1/FT1 CSU/DSU (120 ohm)	*	MT1500A

* items vary depending on the order

T1/FT1 CSU/DSU options

User's Manual	Included	
Power Cord with External Transformer	Included	
Cable: RJ48C to RJ48C (T1 NI Interface)	Included	
Cable: DB9 to DB25 (Console - Serial)	Special Order	
Cable: V.35/M35 male to V.35/M34 male (DTE Interface)	Special Order	

Inspect the unit for any signs of damage. Report any damage to the carrier and contact Black Box Technical Support at 724-746-5500 or info@blackbox.com. Retain all packaging material in case you need to move or ship the unit in the future.

2.2 Site Selection

Follow the guidelines listed below when selecting the installation site.

- The installation site should have an AC power receptacle.
- The following are the maximum suggested cable lengths:

  • V.35 15 m (50 ft,)
  • EIA530 15 m (50 ft.)

  NOTE: If longer distance is needed, a lower than maximum speed with proper cabling and grounding is advisable. For more information, contact Black Box Technical Support at 724-746-5500 or info@blackbox.com.

- The installation site should provide space for adequate ventilation and cable routing. Reserve at least 12 cm (5 inches) at the rear of the unit for cables and airflow.
- The site should provide a stable environment. The operating area should be clean and free from extremes of temperature, humidity, shock and vibration.
- Relative humidity should stay between 0 and 95%. Do not operate the unit at an altitude greater than 3000 meters (10,000 feet).

2.3 Mechanical and Electrical Installation

2.3.1 Mechanical Installation

Figure 2-1. T1/FT1 CSU/DSU Front Panel View

The T1/FT1 CSU/DSU Stand-Alone version is a desktop unit, which is stackable. The front panel is shown in Figure 2-1, and the rear panel is shown in Figure 2-2.

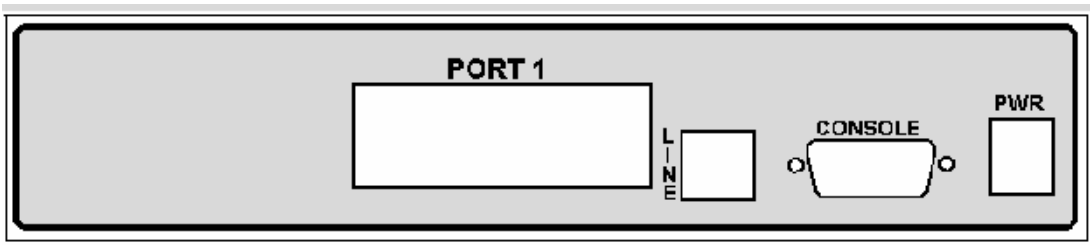


Figure 2-2. T1/FT1 CSU/DSU Rear Panel

2.3.2 Electrical Installation

The T1/FT1 CSU/DSU Stand-Alone version is AC powered. Use the rear right power connector to connect to an AC power outlet using the inline power transformer and cord provided.

The console port is the DB9 connector. For this interface the T1/FT1 CSU/DSU is configured as a DCE device. This port may be connected directly to a DTE device. Pin definitions and pin connections are listed in Table 2-2.

Table 2-2. DB9 Console – Serial Port

Pin Number	Signal	Source
1	Unassigned	
2	Receive Data	DTE
3	Transmit Data	DCE
4	Data Terminal Ready	DTE
5	Ground	DCE-DTE
6	Data Set Ready	DCE
7	Request To Send	DTE
8	Clear To Send	DCE
9	Unassigned	

Table 2-3. RJ-48 Line Connector

Pin Number	Signal	Signal Direction
1	Receive Ring	From T1 Network
2	Receive Tip	From T1 Network
3	Unassigned	
4	Transmit Ring	To T1 Network
5	Transmit Tip	To T1 Network
6	Unassigned	
7	Unassigned	
8	Unassigned	

The DTE port is configured as a DCE device. All available signaling appears on an M34 connector. There are 3 different interfaces supported from the M34 connector. Signaling Interfaces: V.35/M34 and EIA530/M34. The T1 Spartan automatically recognizes each signaling convention and requires NO menu selection or manipulation. Appropriate conversion cables are available from ATL for EIA530 connections. Pin definitions are defined in Tables 2-4 to 2-5.

Table 2-4. V.35/M34 DTE Port Pin Definition

Pin Number	Signa	Sourc
A	Cable Shield	
B	Signal Ground	
C	Request To Send	DTE
D	Clear To Send	DCE
E	Data Set Ready	DCE
F	Data Carrier Detect	DCE
H	Data Terminal Ready	DTE
J	Unassigned	
K	Unassigned	
L	Unassigned	
M	Unassigned	
N	Unassigned	
P	Transmit Data	DTE
R	Receive Data	DCE
S	Transmit Data Return	DTE
T	Receive Data Return	DCE
U	External Clock	DTE
V	Receive Clock	DCE
W	External Clock Return	DTE
X	Receive Clock Return	DCE
Y	Transmit Clock	DCE
Z	Unassigned	
AA	Transmit Clock Return	DCE
BB	Unassigned	
CC	Unassigned	
DD	Unassigned	
EE	Unassigned	
FF	Unassigned	
HH	Unassigned	
JJ	Unassigned	
KK	Unassigned	
LL	Unassigned	
MM	Unassigned	
NN	Unassigned	

Table 2-5. EIA530/DB25 DTE Port Pin Definition

Pin Number	Signa	Sourc
1	Cable Shield	
2	Transmit Data	DTE
3	Receive Data	DCE
4	Request To Send	DTE
5	Clear To Send	DCE
6	Data Set Ready	DCE
7	Signal Ground	
8	Data Carrier Detect	DCE
9	Receive Clock Return	DCE
10	Data Carrier Detect Return	DCE
11	External Clock Return	DTE
12	Transmit Clock Return	DCE
13	Clear To Send Return	DCE
14	Transmit Data Return	DTE
15	Transmit Clock	DCE
16	Receive Data Return	DCE
17	Receive Clock	DCE
18	Local Loopback	DTE
19	Request To Send Return	DTE
20	Data Terminal Ready	DTE
21	Remote Loopback	DTE
22	Data Set Ready Return	DCE
23	Data Terminal Ready Return	DTE
24	External Clock	DTE
25	Test Mode	DCE

2.4 Configuration Setting

2.4.1 Hardware Configuration Setting

All configurations are software programmable. No DIP switches are available. Users should not open the case.

2.4.2 Software Configuration Setting

There is a single configuration that is maintained for the T1/FT1 CSU/DSU in battery-backed-up random access memory, or non-volatile memory.

The factory default configuration is not changeable. Each T1/FT1 CSU/DSU is shipped with the factory default configuration.

The current configuration can be changed at any time. The system automatically stores the current configuration into non-volatile memory. When the system is turned off and then turned back on again, the previous configuration is retrieved as the current configuration.

The factory default configuration may be set into the T1/FT1 CSU/DSU at any time by using the Utility routine, “Clear System Configuration” from the console terminal interface. Table 2-7 lists all factory defaults (below).

Table 2-6. Default Software Configuration

T1 Network Interface	Default
Framing	ESF
Line Code	B8ZS
LBO	0 db
Network Diagnostics	No
Density	Clear
Yellow Alarm	Off
ESF Format	54016
Clear Registers (Statistics)	Yes
Timing Source	Default
Source	Network Interface (NI)
Serial Port (DTE)	Default
Rate	64K * N
RTS	Constant
Clocks (Source)	Line
Remote Loop (Enabled)	Yes
DS0 Map	Default
All Channels	DTE Port
Console Port	Default
Port Speed	9600 bps
Data Bits	8
Parity	None
XON-XOFF Flow Control	No
Security	Default
Enabled/Disabled	Disabled
Password	Default
Miscellaneous	Default
All Loops	Off
All Bert Functions	Off
Event Log	Cleared
ESF Statistics	Cleared
Date/Time	Unchanged
Software Version	Unchanged

3.0 Operation

This chapter describes the T1/FT1 CSU/DSU configuration options and operational functions. The user should refer to Chapter 5: Front Panel Operation and Chapter 6: Terminal Operation for detailed operational procedures.

3.1 Quick Start for T1/FT1 CSU/DSU

After installation, the user may want to become familiar with the equipment immediately. The following abbreviated instructions will give the user a quick start.

3.1.1 Power On

Connect power by attaching the power/transformer cable at the rear of the unit. LEDs will then cycle through.

3.1.2 Return to Default Setting

The unit is shipped with factory default settings.

To restore the factory settings in the future, use the main menu Utility routine – "Clear System Configuration". See Section 2 for factory default values that are restored.

3.2 Using Terminal Setup

To use an RS-232 interface to configure the unit, connect a VT-100 terminal to the DB9/RS-232 connector using a DB9–DB25 cable. The VT-100 terminal can be a PC running VT-100 emulation software. The DB9–DB25 configures the console port as a DCE. Thus a null modem plug or cable is not required for direct connection to a VT-100 (DTE device).

As soon as the T1/FT1 CSU/DSU detects the presence of Data Terminal Ready (DTR) it will output an initial screen. Normal operation of the terminal/T1 will show the following leads active: Pin 2 – DTE/TX, Pin 3 – DTE/RX, Pin 4 – DTE/RTS, Pin 5 – DCE/CTS, Pin 6 – DCE/DSR, Pin 7 – DTE/DCE Ground, Pin 8 – DCE/CD, Pin 20 – DTE/DTR. Should the terminal interface fail to operate, carefully check the above leads.

If "Security" is enabled, the initial screen will be a request for a password. If "Security" is disabled, the initial screen will be the ATL MAIN MENU screen.

3.2.1 Review of Default Settings

The MAIN MENU allows the user to enter any of the subsystems of the T1 Spartan: System Configuration, System Diagnostics, System Alarms and Indicators, Performance Registers, Event Log, and System Utilities. The following keys provide for a means to traverse the menu system: Cursor Up = [Up Arrow], Cursor Down [Down Arrow], Select Entry/Go Down In Menu = [ENTER], Go Up In Menu = [ESC twice]. On the MAIN MENU screen is also displayed the model number of the T1 Spartan, the Software version, the current Date and Time, the Unit ID, and the current System Status. **PRESS ENTER TO VIEW THE SYSTEM CONFIGURATION SCREEN**.

3.1.2.1 Line

Use “Up Arrow” and “Down Arrow” keys to select any Line parameter that requires changing. Use “Right Arrow” to change to a desired parameter.

3.1.2.2 Serial Port – DTE

Use “Up Arrow” and “Down Arrow” keys to select any Serial Port parameter that requires changing. Use “Right Arrow” to change to a desired parameter.

3.1.2.3 System Clock

Use “Up Arrow” and “Down Arrow” to select the System Clock parameter which requires changing. Use “Right Arrow” to change to a desired parameter.

3.1.2.4 DS0-Map Setup

Press “ENTER” to go to the DS0-Map menu. Use “Up Arrow” and “Down Arrow” keys to select the DS0 channel (S) you wish to modify. Use “Right Arrow” to change to a desired parameter. Press “ESC” twice when all changes have been made. Press “ESC” twice, again, to return to the MAIN MENU.

3.3 System Operation

3.3.1 Date

This product is equipped with a RTC (Real Time Clock). The user can change the current date and time as required. The RTC is activated by the manufacturer before shipping. This is to save RTC battery life. The RTC battery has a 10-year power off life cycle.

3.3.2 System Clock

This product has a system clock PLL (Phase Lock Loop) which may be phase locked to the T1 line or the internal oscillator clock of the T1 Spartan. The T1 line signal and the internal clock of the T1 Spartan are all 1.544 Mbps. The default system clock is derived from the T1 line signal often referred to as the Network Interface or NI for short.

3.3.3 Console Port

The console port allows the user to use a local VT-100 terminal via a DB9/RS232 cable connection for system configuration, diagnostics, utilities, etc. The console port must be set to a proper operational mode. The default console port baud rate, data bit length, parity bit length, and XON-XOFF flow control are set as shown in Table 3-1.

Table 3-1. Console Port Default Setting

Item	Options	Default
Baud Rate	9600	9600
Data Bit	8	8
Parity Bit	NONE	NONE
XON-XOFF	OFF	OFF

3.3.4 Security System

The terminal is used to read events, system configurations, diagnostics, and system status. It can also be used to change system configurations and clear the event log, etc. By enabling the security system, the user may restrict terminal access to users who know the password stored in the system. The default password stored in the T1/FT1 CSU/DSU prior to factory shipment is “Default”. Once the Security System is enabled, the user may enter any new password into the T1/FT1 CSU/DSU after providing the old password.

- Password and Security System options are disabled by default.
- The default terminal access password is default.

3.3.5 Configuration

The system automatically saves the current configuration into non-volatile memory. The configuration is thus available each time the unit is powered up. After a power cycle, the current configuration is retrieved and used by the T1/FT1 CSU/DSU.

3.4 DS0 Channel Map

DS0 channel multiplexing is done by the DS0-MAP command. A map contains 24 DS0 channels where a single DS0 channel can be assigned to a DTE port or not used. An idle code is transmitted on all unused channels.

3.5 T1 Network Line Configuration

A detailed option list of the T1 line configuration parameters is in Table 3-2. The following paragraphs will describe each item.

3.5.1 Frame Format Mode

This equipment can be used as a T1/FT1 D4 or ESF frame format DS1 network interface. In ESF frame format mode, the user can choose either AT&T or ANSI facility data link protocol. ESF & T1.403 chooses ANSI ESF data link protocol and a performance report will be sent to the network every second automatically. Also, ANSI and AT&T data link messages are acceptable in ANSI ESF frame format mode. However, AT&T ESF frame format mode only accepts AT&T ESF data link protocol.

3.5.2 Line Code Mode

The T1/FT1 CSU/DSU can be used in AMI (Alternate Mark Inversion) or B8ZS (Bipolar Eight Zero Substitution) line code format.

3.5.3 Line Build Out

The T1 line long haul transmit LBO can be programmed to 0 dB, -7.5 dB, -15 dB, or –22 dB relative to the DS1 transmit level.

3.5.4 Density

The 1's density of the T1/FT1 CSU/DSU may be set to either "Clear" or "62411". The "Clear" parameter selection causes the T1 Spartan to make no modifications to the 1's density of the T1 bit stream. This is sufficient for the line code format that is B8ZS, since B8ZS guarantees a sufficient 1's density. For a line code mode of AMI, the user may wish to select "62411" which will guarantee a sufficient 1's density.

3.5.5 Yellow Alarm

The T1/FT1 CSU/DSU transmits a yellow alarm when LOS (Loss of Signal) is detected, AIS (Alarm Indication Signal), is detected, or OOF (Out of Frame) is detected for 2.5 ±0.5 seconds. Users may disable this feature by setting Yellow Alm to "Off".

3.5.6 Facility Data Link

The T1/FT1 CSU/DSU uses a proprietary facility data link to initiate remote system control, performance and statistics monitoring. In addition, the facility data link is also used to cause proprietary loop backs in a remote T1 Spartan unit.

3.5.7 Inband Signaling

Using T1 D4 framing format and ESF, (both ESF and ESF &T1.403), an inband loopback recognition is used to activate remote loopback operation. This is primarily done by a circuit provider who is testing a circuit.

3.5.8 Idle Code

Any DS0 channel, which is not assigned to a DTE port, is an idle channel. An idle code is transmitted on the idle DS0 channels. The idle code is set to FFh by the T1 Spartan and may not be modified by the user. The idle code is inserted into unused channels after any data inversion, if activated.

Table 3-2. T1 Line Default Setting

Item	Option	Default
Frame Format Mode	ESF, D4, Not Used (N/U)	ESF
Line Code	B8ZS, AMI	B8ZS
Line Build Out	0, 7.5, 15, 22 dB	0 dB
Density	Clear, 62411	Clear
Network Diagnostics	No, Yes	No
Yellow Alarm	Off, On	Off
ESF Format	54016, T1.403	54016

3.6 DTE Configuration (Serial Port)

This product is equipped with one port. The information provided is specific to the Serial Port of the T1/FT1 CSU/DSU. A detailed option list of DTE configuration parameters is in Table 3-3, and the following paragraphs describe each parameter.

3.6.1 Speed

The DTE port can operate at 56KxN or 64KxN bps, (N is 1 to 24). Use the Speed selection parameter to select 56K or 64K. Use DS0 MAP selection parameters to select the activity of the DS0 channels that the DTE port contains.

3.6.2 Request to Send (RTS)

The DTE facility can use RTS (Request To Send) to control transmission. When RTS is “External” and in the OFF state, all ones are sent to the T1 line side on the DTE port associated with the DS0 channels. When RTS is “Constant”, the RTS signal is ignored and forced ON permanently.

3.6.3 Remote Loop

The T1/FT1 CSU/DSU is either enabled or disabled to receive a proprietary remote loop command from a T1/FT1 CSU/DSU connected to the other end of a circuit.

3.6.4 DTE Interface Type

The DTE Serial Port interface type can be V.35 or EIA530. The CSU/DSU automatically senses which interface is present. The user is not required to make any configuration changes. The physical port is a M.34 (female) pinned as a V.35, requiring a cable conversion to EIA-530 (DB-25).

Table 3-3. DTE Serial Port Default Setting

Item	Option	Default
Speed	56K x N, 64K x N (N = 1 - 24)	56K x N
Request To Send (RTS)	Constant, External	Constant
Remote Loop	Enabled, Disabled	Enabled

3.7 System Clock

The system clock source may be any of two sources: the Network Interface (NI) or the Internal Oscillator (INT – T1/FT1 CSU/DSU internal oscillator). The default is shown in Table 3-5.

Table 3-4. System Clock Default Setting

Item	Option	Default
System Clock	NI, INT	NI

3.8 Alarms and Indicators

3.8.1 Alarms

The T1/FT1 CSU/DSU has many types of alarms as listed in Table 3-5. Also, the T1/FT1 CSU/DSU has an Event Log that records the latest 32 alarms with a time and date stamp. Below is listed each alarm together with its meaning and description.

3.8.2 LOS – Loss of Signal

LOS is declared following 175 bit times ±75 bit times if no pulses of either positive or negative orientation are received by the T1/FT1 CSU/DSU.

AIS – Alarm Indication Signal

The AIS alarm is both generated by the CSU/DSU and received by the CSU/DSU. The AIS itself is a bit stream of all 1's. A LOS condition causes the T1 Spartan to output an AIS pattern. In a similar manner, AIS is received by the T1/FT1 CSU/DSU when a remote unit, either CSU/DSU or central office unit, is in a LOS condition.

Red – Alarm

Red alarm is declared by the T1/FT1 CSU/DSU when it receives 192 consecutive 0s.

Yellow – Alarm

Yellow alarm is declared whenever a signal is present but the T1/FT1 CSU/DSU is unable to secure synchronization with it.

FErr – Frame Error Alarm

The T1/FT1 CSU/DSU receives a framing pattern in the 193rd bit position. FErr is declared when the T1 CSU/DSU detects an error in the framing pattern received.

CRC6 – Circular Redundancy Check 6 Alarm

In ESF mode, a circular redundancy check is generated as a result of the data processed from previous frame(s). Whenever the generated circular redundancy check does not match the calculated circular redundancy check value, a CRC6 alarm is declared.

BPV – BiPolar Violation Alarm

When the line code is set to B8ZS, BPV reflects the number of bipolar violations that have occurred not counting the code words of the B8ZS. In AMI mode, any bipolar violations are reflected in the BPV count. In other words, any BPV is reflective of an error that has occurred.

Table 3-5. Alarm Type Table

ALA	ALARM DESCRIPTION
LOS	Loss Of Signal on Network
AIS	Alarm Indication Signal – all
Red	All 0's being received
Yello	Loss of frame
FErr	Frame error detected
CRC	Circular Redundancy Check
BPV	Bit errors are occurring

3.8.2 Indicators

The Indicators presented include the real time status of "Request To Send" (RTS), "Data Carrier Detect" (DCD), and the current status of loops that may be active at the Network Interface and the DTE port.

RTS – Request to Send

RTS is a control signal presented by the DTE device when it is ready to transmit data to the CSU/DSU. In the "Configuration" section of the T1/FT1 CSU/DSU, RTS is described as either Constant or External. If the CSU/DSU is declared Constant, it is assumed to be present all of the time and shown as present regardless of whether it is present or not. If External, the true status of the control signal of the DTE is shown in real time.

CTS – Clear to Send

CTS is a control signal presented by the T1/FT1 CSU/DSU to the DTE indicating when it is permitted to receive transmitted data from the DTE device. The state of CTS is governed by several conditions. First, if the Network Interface is in an abnormal condition, CTS is held low indicating to the DTE device not to transmit data. Second, if RTS is External and the DTE device is not presenting the RTS signal, then the CTS signal is held low.

DCD – Data Carrier Detect

DCD is a control signal presented by the T1 Spartan to the DTE indicating a signal is present at the Network Interface and that it is possible to transmit data from the DTE device. If RTS is set to Constant, DCD is always shown as present regardless of the state of the Network Interface.

DTR – Data Terminal Ready

DTR is a control signal presented by the DTE to the T1 Spartan. DTR generally reflects the DTE's ability to receive data from the T1/FT1 CSU/DSU. If RTS is set to Constant, DTR is always shown as present regardless of the state of the Data Terminal Equipment attached.

Loop Status

For real time status purposes, the existence of a loop condition is shown for each physical part of the T1/FT1 CSU/DSU– NI and DTE.

3.9 Performance Registers

The T1/FT1 CSU/DSU has four performance registers that reflect operational statistics of the unit. A summary of the performance registers and their meaning are listed in Table 3-7. Each parameter is described in detail below.

3.9.1 ES – Errored Seconds

In T1/D4 line format, the definition of ES is the number of bipolar violations that have occurred during any second interval. In T1/ESF line format, the definition of ES is the number of CRC6 errors plus the number of OOF errors detected within any one second. Both current counts and the past 24 hour counts are displayed.

3.9.2 BES – Bursty Errored Seconds

In T1/D4 line format, this information is not available or defined. In T1/ESF line format, it is the total number of CRC6 errors that have occurred divided by 320. Both current counts and the past 24 hour counts are displayed.

3.9.3 SES – Severely Errored Seconds

In T1/D4 line format, SES is the total number of bipolar violations divided by T1 Spartan in any one second. In T1/ESF line format, SES is the number of CRC errors divided by 320 plus the number of occurrences of OOF. Both current counts and the past 24 hour counts are displayed.

3.9.4 UAS – UnAvailable Seconds

In both T1/D4 and T1/ESF line formats, UAS is the number of occurrences of 10 or greater Severely Errored Seconds during any one second. . Both current counts and the past 24 hour counts are displayed.

3.9.5 Time in Interval

An interval is 15 minutes duration. There are 96 intervals in 24 hours. The time in interval parameter shows the number of seconds within any 15-minute interval.

3.9.6 Number of Valid Intervals

The number of valid intervals is a count of up to 96 that indicates the number of previously recorded intervals that have been saved by the T1/FT1 CSU/DSU. Each previously recorded interval is available for viewing on two separate screens.

3.9.7 Performance Register Intervals

Press “ENTER” from the Performance Register screen display, and the T1/FT1 CSU/DSU goes to the next screen in the menu system – Performance Register Intervals. This screen is composed of two screens of 48 groupings of intervals on each page. Press the “ENTER” key successively, and the two screens alternately display. Each interval displayed represents 15 minutes of CSU/DSU operation. In each interval, the number of Errored Seconds (ES), UnAvailable Seconds (UAS), Severely Errored Seconds (SES), and Bursty Errored Seconds (BES) is displayed. After 24 hours of operation, the display begins to overlay 24-hour-old information with current interval information. The Performance Register Intervals display is actually a First In First Out queue. The newest complete 15 minute interval appears in Interval “01”. The interval that is fifteen minutes older than the current interval appears in Interval “02”. The 23 hours 45 minutes old interval appears in Interval “96”. Each interval can be correlated with the actual time of day. Any interval not containing valid information is shown as “NOT VALID INTV”.

Table 3-6. Performance Parameter List

Performance Parameter	Description	Definition (T1/D4)	Definition (T1/ESF)
ES	Errored Seconds	BPV≥1	CRC6 Error ≥ 1, OOF ≥1
BES	Bursty Errored Seconds	Not Available	1 < CRC6 < 320
SES	Severely Errored Seconds	BPV ≥ T1/FT1 CSU/DSU	CRC ≥ 320, or OOF ≥ 1
UAS	Unavailable Seconds	≥ 10 consecutive SES	≥ 10 consecutive SES

3.10 Event Log

The Event Log contains 32 chronological entries. Each entry is date and time stamped to indicate when it occurred. In addition, a status is provided indicating additional information about the event. Typical status will include the “Start” and “End” of a particular event. The event itself is identified as to source and type of event. All alarms are placed in the Event Log. When the number of events exceeds 32, the log operates as a First In First Out (FIFO) queue. Thus the last 32 events in time are always available for viewing. The Event Log screen is NOT updated in real time. Upon entry to the Event Log, the current Event Log is presented. To see additional entries that may have been added since viewing the Event Log, press “ESC” twice, and then re-enter the Event Log.

3.11 System Utilities

System Utilities routines include: Set

System Time

Set System Date

Enter Unit Identification

Number Clear System

Configuration Enter New

Password Enable/Disable

Security

The system time is set at the factory and reflects Mountain Time. The user may change the system time by selecting the System Utilities – Set System Time function and pressing Enter. A small box is located near the center of the CRT screen containing the current Hours/Minutes/Seconds (Note: military time is used, where hours go from 0 to 23). The cursor is positioned to the hours field. To change the system time enter a new value for hours, minutes, and seconds. The Right Arrow and Left Arrow keys are also active allowing the user to skip over fields that are correct as is. When the update is complete, press “ESC” twice to go back up to the main utilities screen.

3.11.1 Set System Date

The user may change the system date by selecting the System Utilities – Set System Date function and pressing Enter. A small box is located near the center of the CRT screen containing the current Month/Day/Year. The cursor is positioned to the month field. To change the system date enter a new value for month, day, and year. The Right Arrow and Left Arrow keys are also active allowing the user to skip over fields that are correct as is. When the update is complete, press “ESC” twice to go back up to the main utilities screen.

3.11.2 Enter Unit Identification Number

The user may change the system Unit ID by selecting the System Utilities – Enter Unit Identification Number function and pressing Enter. A small box is located near the center of the CRT screen containing the current Unit Identification Number. The default Unit Identification Number is “00000001”. The cursor is positioned to the beginning of the numeric Unit Identification field. To change the Unit Identification Number, use the numeric keys to overwrite a new eight-digit number. The Unit Identification Number appears on certain CRT screens and helps to provide a unique identifier if screens are copied to a printer for later review. The Right Arrow and Left Arrow keys are also active allowing the user to skip over digits that are correct as is. When the update is complete, press “ESC” twice to go back up to the main utilities screen.

3.11.3 Clear System Configuration

The user may clear the current system configuration back to the factory default settings. Position the cursor on the main System Utilities screen to “Clear System Configuration” and press Enter. A small box is located near the center of the CRT screen containing a verification question “Clear All Configuration!!!”. A response of either (Y)es or (N)o is requested. If “N” is entered, the T1 Spartan returns to the main System Utilities screen. If “Y” is entered, a new message appears “<<< ARE YOU SURE!!! >>>, followed by (Y)es or (N)o. This is a second verification screen as a safeguard against accidental resetting of the system to a factory configuration. If “N” is entered, the system returns to the main System Utilities screen. If “Y” is entered, the entire T1 Spartan is reset to the factory configuration, the system is re-booted, and the main Console menu appears on the CRT following initialization of the unit.

3.11.4 Enter New Password

The philosophy of password security only impacts access to the Console interface. The user is only restricted any access to the front panel LCD/front panel push buttons when the console port is occupied and active. If security is Enabled, a password has already been entered to access the Console terminal system. If security is Disabled, no prior check of any password has up to this point been of concern. The result of this is that no old password is checked prior to entering a new password. If security is enabled, a valid

password must be entered prior to entering the Console terminal menu system. This occurs following the next initialization of the T1/FT1 CSU/DSU, whether from being powered off and on, or from having the factory configuration installed into the unit.

Upon entry to this screen, a small box displaying " Enter New Password=> ******** " is displayed. The cursor is positioned to the first of the eight asterisks. Using both numeric and alphabetic keys, enter up to eight characters. When complete, press "ESC" twice. A second screen then appears – " Validate Password=> ******** ". Re-enter the same password a second time and press "ESC" twice. If both first and second entries of the same password occur, the T1/FT1 CSU/DSU will accept the new password and stores it in its non-volatile memory. If the first and second entry do not match after pressing "ESC" twice, the message "Invalid Password" is displayed for approximately two seconds, followed by the user being returned to the System Utilities screen.

3.11.5 Enable/Disable Security

The user may Enable or Disable the system security function by selecting the System Utilities – Enable/Disable Security function and pressing Enter. A small box is located near the center of the CRT screen containing the message "Enable/Disable => Disabled". The user may use the Right Arrow key to switch between Enable and Disabled. When the update is complete, press "ESC" twice to go back up to the main utilities screen.

If security is Disabled, any time a terminal is connected to the Console port, the main menu of the T1/FT1 CSU/DSU appear. If security is Enabled, any time a terminal is connected to the Console port, a password must be entered before entry into the terminal functions of the CSU/DSU is allowed.

3.12 LED Operation

The front panel has 16 LEDs for operation and error indications. Table 3-7 lists each LED and its color and meanings.

Table 3-7. Front-Panel LED Table

LED		Color	Meaning
NI	Alarm	Gree n	No alarm condition present, the unit is operating normally Alarm condition present: LOS, LOF, CRC, Red, Yellow, or AIS
	BPV	Off Yellow	No bipolar violations in the last second Bipolar violation present in the past one second
	Loop	Off Yellow	No network interface loop is present Loop (remote or local) is present: Payload, CSU,
	1s Den	Off Re	Ones density is within specification Ones density is insufficient to recover NI timing
DTE	DCD	Off Green	The NI is not available due to LOS, Yellow, Red, or AIS alarms The NI is available to receive DTE data and is in a normal operating condition
	RTS	Off Green	RTS is set external and no RTS is present from DTE RTS is constant or RTS is present from DTE
	Loop	Off Yellow	No loop is present Local or remote loop is present

4.0 Maintenance

4.1 System Initialization

At power up, a system initialization routine runs. All LEDs flash to verify their functionality.

4.2 Near End Loopback

The near end loopbacks including CSU loopback, NI local loopback, Payload loopback, DSX-1 local loopback, and DTE local loopback, are activated by the local T1/FT1 CSU/DSU. The loopbacks occur at the near end facility. The following paragraphs describe each loopback in detail.

4.2.1 CSU Loopback

The CSU loopback is illustrated in FIGURE 4-1. The outgoing signal is looped back through the T1 PCM transceiver. All 24 DS0 channels are looped back to the receiver path. This loopback test is activated by the CSU LOOP command. This loopback test can be used with the QRSS diagnostic test pattern to validate the local T1 CSU/DSU's integrity. The CSU loopback test can be activated from the front panel or console terminal.

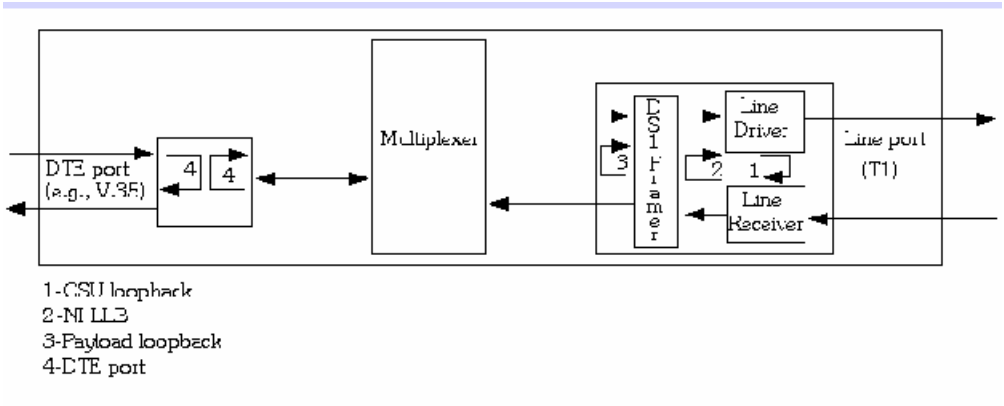


Figure 4-1. Loopback Block Diagram

4.2.2 Network Interface Local Loopback – Ni LLB

The Network Interface Local loopback (Ni LLB) is illustrated in Figure 4.1. The incoming T1 line signal is looped to the outgoing T1 signal before the T1 transceiver framer. This loopback is used to isolate the local equipment from a troubled T1 transmission line. The Ni LLB test can be activated from the front panel or console terminal.

4.2.3 Payload Loopback

The Payload loopback is illustrated in Figure 4.1. The incoming signal is looped to the outgoing T1 signal after the T1 transceiver framer. This loopback is used to isolate the DTE port from the troubled T1 transmission line. The Payload loopback test can be activated from the front panel or console terminal.

4.2.4 DTE Local Loopback

The DTE local loopback is illustrated in Figure 4.1. This is a bi-directional loop that loops all DTE data to the DTE and also loops all data that would normally be presented to the DTE back to the originator of DTE data. The DTE loopback test can be activated from the front panel or console terminal.

NOTE: The DTE local loopback works only when one or more DS0 channels are mapped to the DTE port.

4.3 Far End Loopbacks

The Far-end loopbacks (remote line loopback, remote payload loopback, remote DTE loopback, and remote drop and insert loopback) can be activated by the local CSU/DSU to cause the remote 1510 to perform the loopbacks. Inband codes, AT&T and ANSI FDL protocols, and proprietary codes are utilized to send remote loopback commands to the far-end facility. Inband codewords are supported by D4, ESF, or ESF&T1.403 framing format. When using AT&T FDL messages, the Line port must be set for ESF or ESF&T1.403 framing format. When using ANSI FDL messages, the Line port must be in ESF&T1.403 framing format. All remote loopbacks can be activated from the front panel or console terminal.

Upon initiation, a “Pend” message is shown on the LCD or console terminal screen. If the remote facility responds to a remote loopback activate command, an “On” message appears in the lower right corner of the display. If the remote facility does not respond to a remote loopback activate command, an “Off” message appears in the lower right corner of the display.

It is best to use remote loopbacks in conjunction with patterns (such as QRSS or 2047) designed to measure the T1 network line integrity. The procedure is as follows:

1. Send a remote loopback command to cause the remote facility to perform a loopback.
2. Activate an appropriate diagnostics test pattern.

The following are descriptions for each type of far-end loopback.

4.3.1 Remote Line Loopback (REM LN/LP)

The remote line loopback is illustrated in Figure 4.1. The remote line loopback is initiated by the remote equipment through inband signaling or ESF data link messages with AT&T or ANSI protocol. Table 4.1 shows the inband remote line loopback code used in D4. Table 4.3 shows the ANSI T1.403 ESF data link remote line loopback code. Remote line loopback tests can be activated from the front panel or console terminal.

4.3.2 Remote Payload Loopback (REM PAYLD)

The remote payload loopback is illustrated in Figure 4.1. The remote payload loopback is initiated by the remote equipment through ESF data link messages with AT&T or ANSI protocol. Remote payload loopback tests can be activated from the front panel or console terminal.

The telephone company service provider may also issue commands to cause a payload loopback in the remote 1510. Table 4.2 shows the AT&T ESF codeword used and Table 4.3 shows the ESF T1.403 data link remote payload loopback codewords used by the Telephone Company.

4.3.3 Remote DTE Loopback (REM DTE/LP)

The remote DTE loopback is illustrated in Figure 4.1. A proprietary protocol in the ESF facility data link is used to enable and disable a remote 1510 DTE port's bi-directional loopback. This loopback provides a unique way to isolate problems of a specific data path from the T1 network line toward the remote DTE port and vice versa.

4.4 Verifying T1/FT1 CSU/DSU Operations

The purpose of this section is to help the user determine where a possible fault in the network may lie. For this, the user needs to know the exact architecture of the network. Then standard network trouble shooting procedures should be followed, which involve sectionalizing the network and performing loopback tests on segments of the network.

The purpose here is to help the user determine whether the CSU/DSU equipment is at fault if tests have pointed a suspicious finger at this equipment. The procedures outlined here depend on test equipment and other equipment availability.

The organization of these procedures start from the simple to the complex. The procedure ends when a definitive conclusion is made that a particular piece of equipment is at fault. To verify that the CSU/DSU equipment is not at fault, specialized equipment such as a BERT (Bit Error Rate Test) set may be needed.

4.4.1 Quick Test

Remove all line and DTE connections from the CSU/DSU. Remove power. After a few seconds, re-apply power. Observe the power-up initialization sequence. If this fails, then the CSU/DSU has failed.

See if the LEDs show any abnormal displays. If yes, use the LED indications to guide the user to test other parts of the network, such as the T1 line, or DTE equipment.

Especially during initial installation, excessive errors may be due to (a) an incorrect configuration of either the CSU/DSU or the equipment at the other end of the line, or (b) due to faulty line installation, which results in excessive noise, cross talk, or impedance mismatch. Especially in electrically noisy environments, such as central offices, use of shielded cables are mandatory.

4.4.2 Substitution

If a spare T1/FT1 CSU/DSU is available, then replace the non-working one with the spare. The user must carefully configure the spare exactly as the non-working one. If the substitution clears the problem, then the original non-working one is suspect. Note that this is not definitive as other reasons may cause the same symptom. A good practice is to reconfigure the original one and swap once more.

If both units behave the same, then the problem is probably elsewhere.

5.0 Console Operations

The T1/FT1 CSU/DSU provides comprehensive reports and an enhanced configuration capability through the console port. A VT-100 type terminal or a modem can be connected to the console port in the front of the T1 Spartan T1/FT1. Using single- entry commands and arrow keys, the T1/FT1 CSU/DSU can be configured and monitored. On each screen, the available commands and the configurable fields are shown. Upon power up, a main menu is displayed. The default configuration of the console port is 9600 bps, 8 data bits, and no parity. The RS-232 connection is a standard DCE interface. The T1/FT1 CSU/DSU expects RTS and DTR to be high. In response, CTS, CD and DSR are held high.

NOTE: On the lower left section of the screen, a time-of-day and date display indicates the time/date the current screen is shown.

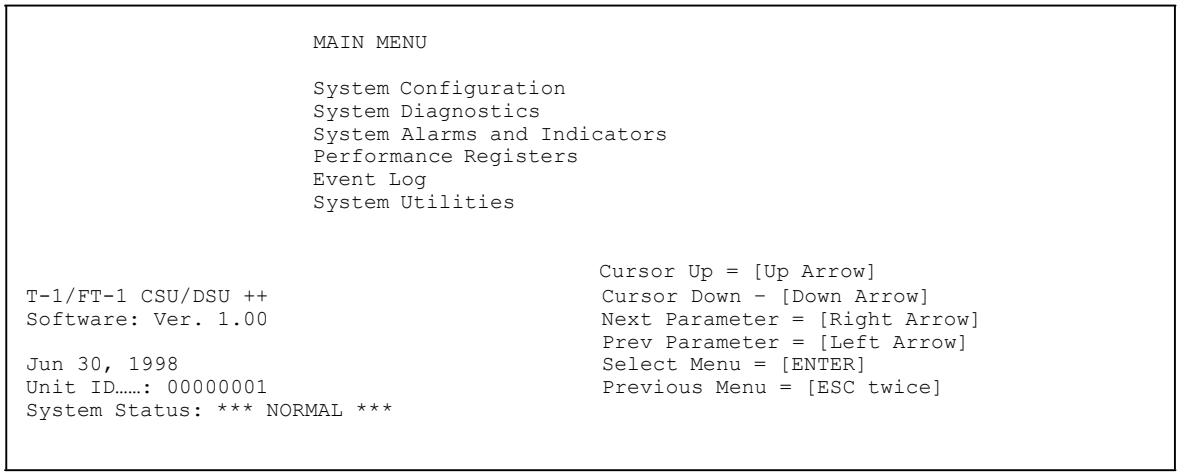


Figure 5-1. Console Main Menu -1

If the terminal screen is illegible, check if the right cable is being used, and if the console port parameter setting matches the terminal settings using the front panel Utilities/CONSOLE command.

The main menu consists of six groups of commands, System Configuration, System Diagnostics, System Alarms and Indicators, Performance Registers, Event Log, and System Utilities.

5.1 System Configuration

To display the System Configuration screen, use the up and down arrow keys to position the cursor adjacent to the System Configuration menu item and press the ENTER key.

```
                                                                    Jun 30, 1998
T-1/FT-1 CSU/DSU ++                                                 13:43:19
Unit ID: 00000001
                      SYSTEM CONFIGURATION

 Network (NI)                                                  Serial Port

Framing…..: ESF                                    Speed……..: 64K * N
Line Code.: B8ZS                                             RTS……..: Constant
LBO.(Neg).: 0 db                                             Rem Loop.: Enabled
Density…….: Clear
NTWK Diag.: No
Yellow Alm: Off
ESF Format: 54016

System Clock
Source…….: NI


                      DS0 Map = [Enter]
```

The system configuration may be changed by positioning the cursor adjacent to an entry that needs to be altered. This is done by using the up arrow and down arrow keys. Once positioned, left arrow and right arrow keys may be used to cycle through each parameter to a desired entry. When complete, press “ESC” twice to return to the main menu.

5.1.1 DS0 Map

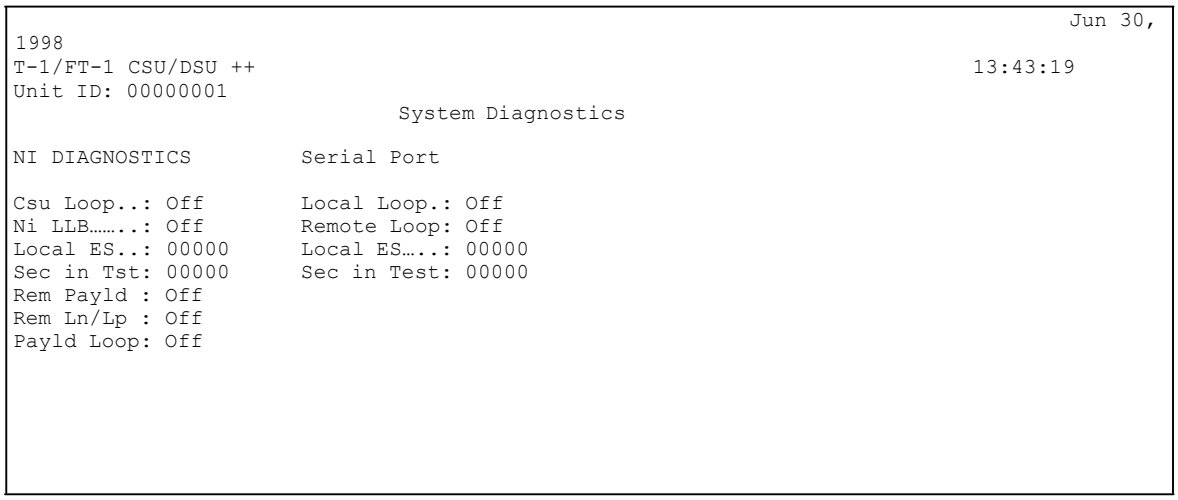
From the System Configuration screen press ENTER to view the DS0 Map.

```
                                          Jun 30, 1998
T-1/FT-1 CSU/DSU ++                                         13:43:19
Unit ID: 00000001

                        T-Channel (DS0) Allocation

                          DS0 # Mode          DS0 # Mode
                           01:  DTE            13:  DTE
                           02:  DTE            14:  DTE
                           03:  DTE            15:  DTE

                           04:  DTE            16:  DTE

                           05:  DTE            17:  DTE

                           06:  DTE            18:  DTE

                           07:  DTE            19:  DTE

                           08:  DTE            20:  DTE
                           09:  DTE            21:  DTE

                           10:  DTE            22:  DTE

                           11:  DTE            23:  DTE

                           12:  DTE            24:  DTE
```

The DS0 Map may be changed by positioning the cursor adjacent to an entry that needs to be altered. This is done by using the up arrow and down arrow keys. Once positioned, left arrow and right arrow keys may be used to cycle through each parameter to a desired entry. When complete, press “ESC” twice to return to the System Configuration screen.

5.2 System Diagnostics

The System Diagnostics screen allows manipulation of network interface diagnostics and serial port diagnostics. From the main menu, position the cursor adjacent to System Diagnostics and press ENTER.



The System Diagnostics screen may be exercised by positioning the cursor adjacent to an entry where action is required. This is done by using the up arrow and down arrow keys. Once positioned, left arrow and right arrow keys may be used to cycle through each parameter to a desired entry. When complete, press “ESC” twice to return to the System Configuration screen.

5.3 System Alarms and Indicators

The System Alarms and Indicators screen provides information on the network interface and the DTE serial port. All alarms and indicators are updated in real time. Counters may be reset by pressing “R”.

```
Jun 30, 1998
T-1/FT-1 CSU/DSU ++                                                    13:43:19
Unit ID: 00000001
                        System Alarms and Indicators

     NI Interface             Serial Port

      State  ErrSec      Indicators
LOS..:  No   00000       RTS..: On
AIS..:  No   00000       CTS..: On
Red..:  No   00000       DCD..: On
Yel..:  No   00000       DTR..: On
FErr.:  No   00000
CRC6.:  No   00000       Loop.: Off
BPV..:  No   00000

Loop.: Off



              Reset Counters = [R]
```

5.4 Performance Registers

The performance registers are presented on the following screen. The performance registers include Errored Seconds, Unavailable Seconds, Severely Errored Seconds, and Bursty Errored Seconds. An interval is defined as fifteen minutes. Statistics are provided in real time for the current interval. As an interval completes, its information is stored in one of the past 24 hour intervals. Thus all intervals for the past 24 hours are available for examination. By pressing ENTER, from the screen below, previously stored intervals are available on two additional screens. Finally, the screen below also shows the number of seconds in the current interval and the number of valid intervals that have been stored away for examination.

```
                                                                       Jun 30,
1998
T-1/FT-1 CSU/DSU ++
        13:43:19
Unit ID: 00000001


                        Performance Registers

  Register              Current   24 Hour

Errored Seconds……...: 000     00000
Unavailable Seconds……..: 000     00000
Severely Errored Seconds: 000     00000
Bursty Errored Seconds..: 000     00000

Time in Interval…….: 000
# Valid Intervals……..: 000



               Performance Register Intervals = [ENTER]
```

```
                              Performance Registers Intervals

    INT ES  UAS SES BES              INT ES  UAS SES BES           INT ES  UAS SES BES
 01. 000 000 000 000          17. NOT VALID INTV            33. NOT VALID INTV
 02. 000 000 000 000          18. NOT VALID INTV            34. NOT VALID INTV
 03. 000 000 000 000          19. NOT VALID INTV            35. NOT VALID INTV
 04. 000 000 000 000          20. NOT VALID INTV            36. NOT VALID INTV
 05. NOT VALID INTV           21. NOT VALID INTV            37. NOT VALID INTV
 06. NOT VALID INTV           22. NOT VALID INTV            38. NOT VALID INTV
 07. NOT VALID INTV           23. NOT VALID INTV            39. NOT VALID INTV
 08. NOT VALID INTV           24. NOT VALID INTV            40. NOT VALID INTV
 09. NOT VALID INTV           25. NOT VALID INTV            41. NOT VALID INTV
 10. NOT VALID INTV           26. NOT VALID INTV            42. NOT VALID INTV
 11. NOT VALID INTV           27. NOT VALID INTV            43. NOT VALID INTV
 12. NOT VALID INTV           28. NOT VALID INTV            44. NOT VALID INTV
 13. NOT VALID INTV           29. NOT VALID INTV            45. NOT VALID INTV
 14. NOT VALID INTV           30. NOT VALID INTV            46. NOT VALID INTV
 15. NOT VALID INTV           31. NOT VALID INTV            47. NOT VALID INTV
 16. NOT VALID INTV           32. NOT VALID INTV            48. NOT VALID INTV


                               Next 48 Registers = [ENTER]
```

```
                                                                          Jun 30,
1998
T-1/FT-1 CSU/DSU ++                                                      13:43:19
Unit ID: 00000001
                          Performance Registers Intervals

  INT ES  UAS SES BES           INT ES  UAS SES BES           INT ES  UAS SES BES
  49. NOT VALID INTV           65. NOT VALID INTV           81. NOT VALID INTV
  50. NOT VALID INTV           66. NOT VALID INTV           82. NOT VALID INTV
  51. NOT VALID INTV           67. NOT VALID INTV           83. NOT VALID INTV
  52. NOT VALID INTV           68. NOT VALID INTV           84. NOT VALID INTV
  53. NOT VALID INTV           69. NOT VALID INTV           85. NOT VALID INTV
  54. NOT VALID INTV           70. NOT VALID INTV           86. NOT VALID INTV
  55. NOT VALID INTV           71. NOT VALID INTV           87. NOT VALID INTV
  56. NOT VALID INTV           72. NOT VALID INTV           88. NOT VALID INTV
  57. NOT VALID INTV           73. NOT VALID INTV           89. NOT VALID INTV
  58. NOT VALID INTV           74. NOT VALID INTV           90. NOT VALID INTV
  59. NOT VALID INTV           75. NOT VALID INTV           91. NOT VALID INTV
  60. NOT VALID INTV           76. NOT VALID INTV           92. NOT VALID INTV
  61. NOT VALID INTV           77. NOT VALID INTV           93. NOT VALID INTV
  62. NOT VALID INTV           78. NOT VALID INTV           94. NOT VALID INTV
  63. NOT VALID INTV           79. NOT VALID INTV           95. NOT VALID INTV
  64. NOT VALID INTV           80. NOT VALID INTV           96. NOT VALID INTV

                               Next 48 Registers = [ENTER]
```

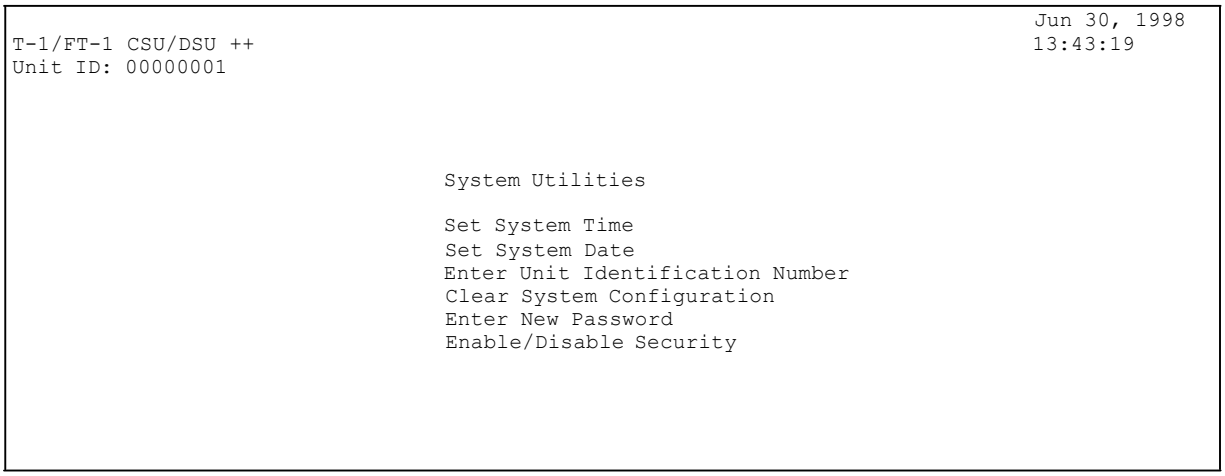
5.5 Event Log

The Event Log is a presentation of significant events as they occur in real time. The Event Log holds in a first in first out queue, a total of 32 entries. Each event is identified as to source, the event itself, the event's start or end status, and the date and time of the event. The Event Log may be cleared by typing "C".

```
                                                                    Jun 30,
1998
T-1/FT-1 CSU/DSU ++                                                 13:43:19
Unit ID: 00000001              EVENT LOG

  Event    Status   Date   Time          Event    Status   Date    Time
No Entry                                        No Entry
No Entry                                        No Entry
No Entry                                        No Entry
No Entry                                        No Entry
No Entry                                        No Entry
No Entry                                        No Entry
No Entry                                        No Entry
No Entry                                        No Entry
No Entry                                        No Entry
No Entry                                        No Entry
No Entry                                        No Entry
No Entry                                        No Entry
No Entry                                        No Entry
No Entry                                        No Entry
No Entry                                        No Entry
No Entry                                        No Entry

            Clear Event Log = [C]
```

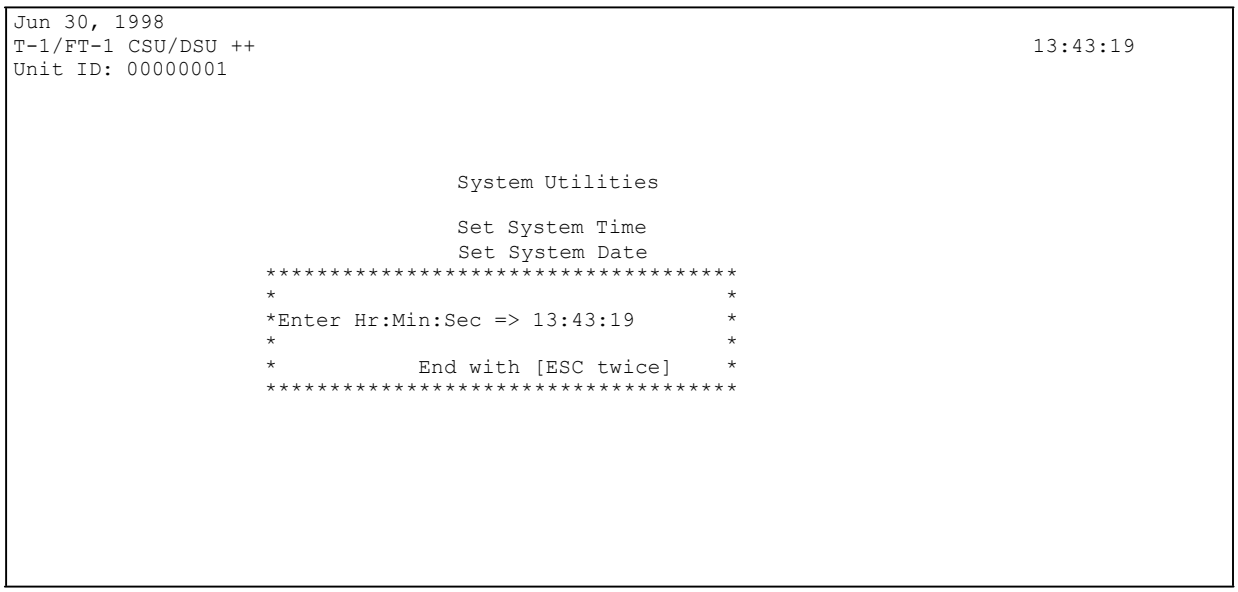
5.6 System Utilities

The System Utilities screen allows selection of any one of the following: Set System Time, Set System Date, Enter Unit Identification Number, Clear System Configuration, Enter New Password, and Enable/Disable Security. To go to any of the above routines, use the up and down arrow keys and position the cursor adjacent to the desired function, then press ENTER.



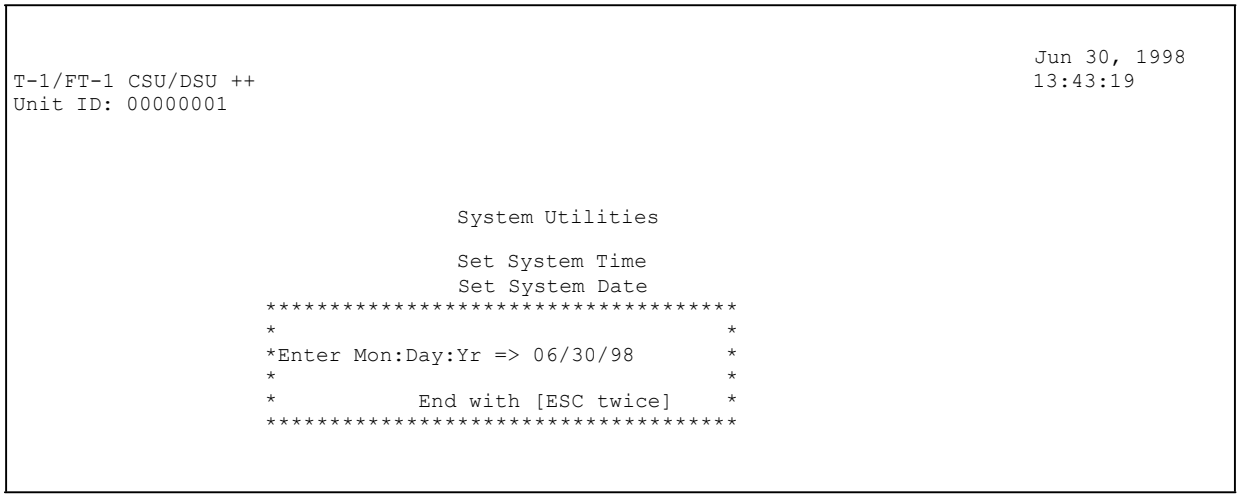
5.6.1 Set System Time

Enter the digits of the current hour, minutes, and seconds. When complete, press “ESC” twice.



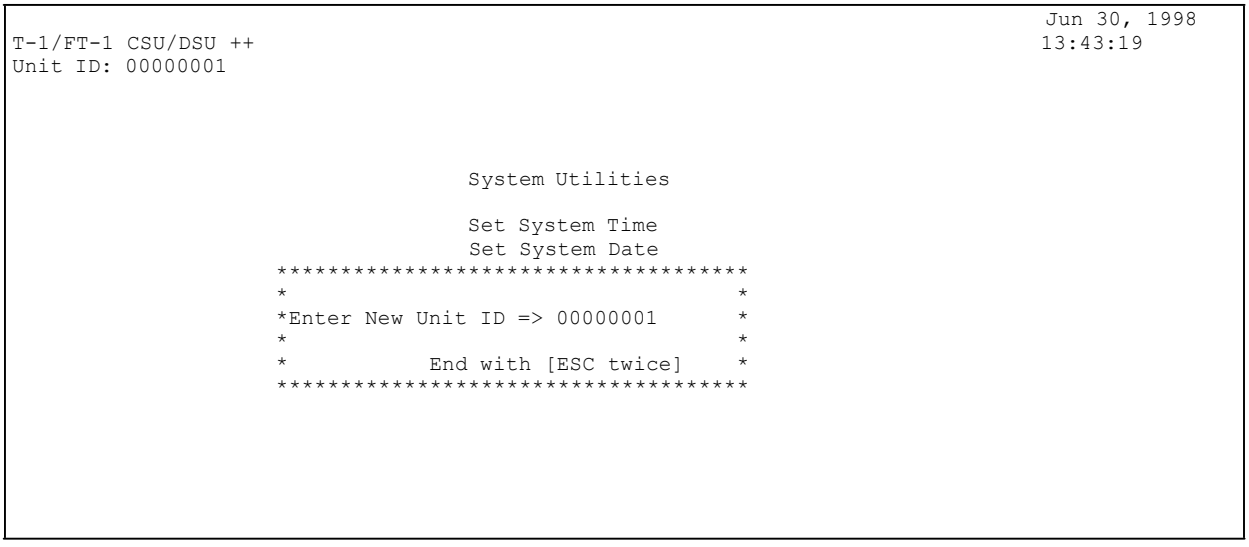
5.6.2 Set System Date

Enter the digits of the current month, day, and year. When complete, press “ESC” twice.



5.6.3 Enter Unit Identification Number

Enter the unique digits of the unit’s identification number (max of 8 digits). When complete press “ESC” twice.



5.6.4 Clear System Configuration

This function clears the current T1/FT1 CSU/DSU configuration and places the CSU/DSU into a factory default configuration. For specifics of the default configuration see Section 5.5.1.2. A response of either Yes “Y”, or No “N” is required.

```
                                                                    Jun 30, 1998
T-1/FT-1 CSU/DSU ++                                                 13:43:19
Unit ID: 00000001



                          System Utilities

                          Set System Time
                          Set System Date
                  ************************************
                  *                                  *
                  *    Clear All Configuration!!!    *
                  *                                  *
                  *    (Y)es or (N)o                 *
                  ************************************
```

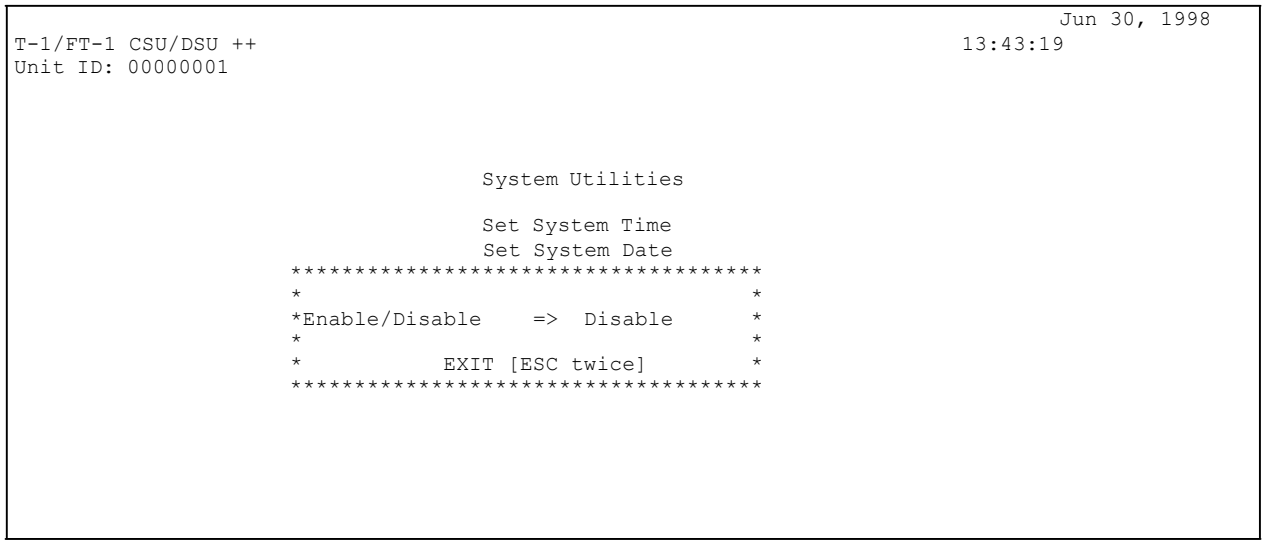
5.6.5 Enter New Password

The T1/FT1 CSU/DSU may use password protection. If desired, a password should be entered (maximum of eight alpha/numeric characters). This function works in conjunction with enabling the security feature. Once a password is entered, a second verification entry is required. The entered password will be requested upon entry to the console terminal function if security is enabled.

```
                                                                    Jun 30, 1998
T-1/FT-1 CSU/DSU ++                                                 13:43:19
Unit ID: 00000001



                          System Utilities

                          Set System Time
                          Set System Date
                  ************************************
                  *                                  *
                  *Enter New Password=> ********      *
                  *                                  *
                  *           End with [ESC twice]   *
                  ************************************
```

5.6.6 Enable/Disable Security

The T1/FT1 CSU/DSU may use password security for entry into the console terminal. The combination of entering a password and enabling security accomplishes this function. Once entry has been gained into the console terminal functions, it is possible to enter a new password and also to disable security.



Appendix A: PRBS (Pseudo-Random Bit Sequence)

PRBS (Pseudo-Random Bit Sequence) is defined in CCITT G.732, and consists of a 15-stage shift register that generates every combination of 15-bit words, and repeats every 32,767 bits.

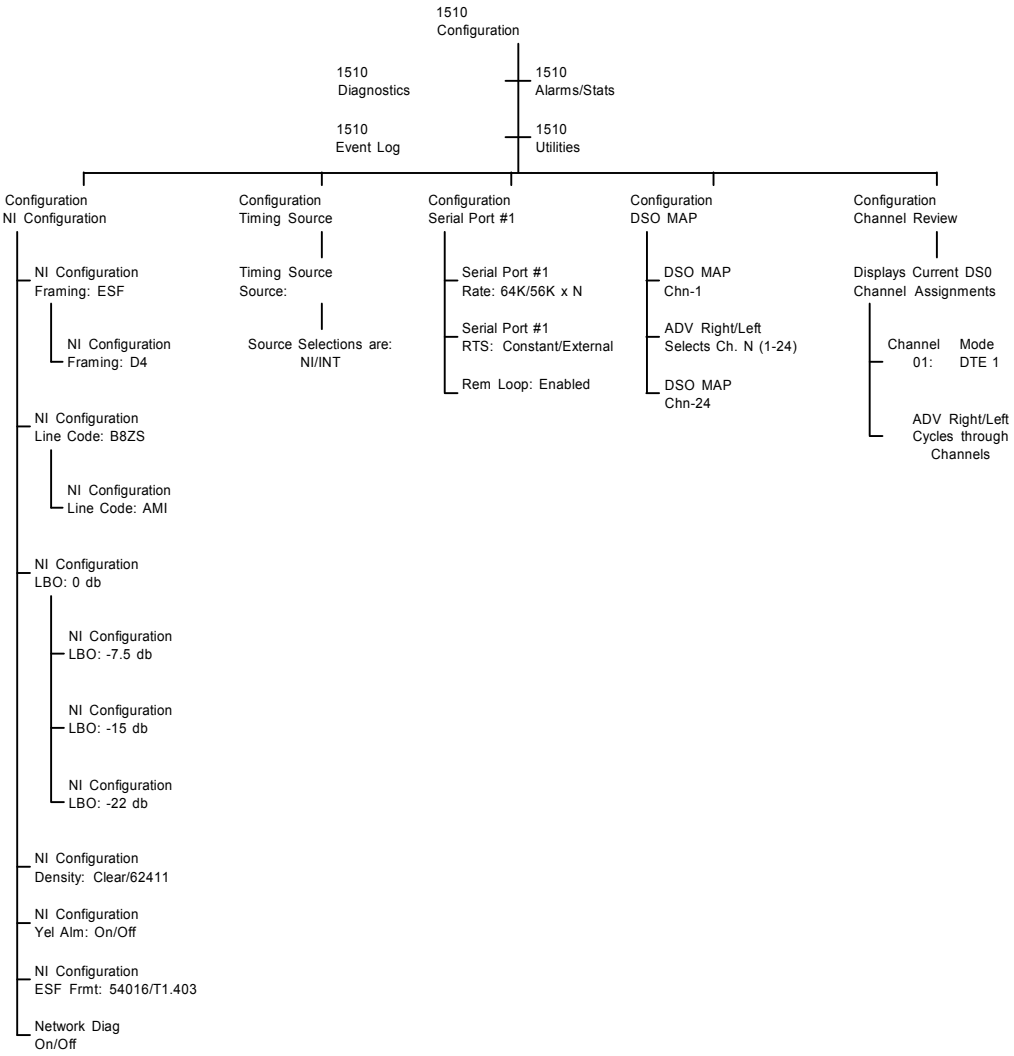
The pattern is generated in a 15-stage register whose 14th and 15th stage outputs are added in a modulo-two addition stage, and the result fed back to the input of the first stage.

This test pattern can be used in conjunction with a local loopback to test the local T1/FT1 CSU/DSU's integrity. It can also be used in conjunction with remote loopback to test a remote T1/FT1 CSU/DSU and its associated E1 network line quality.

Appendix B: Menu Tree

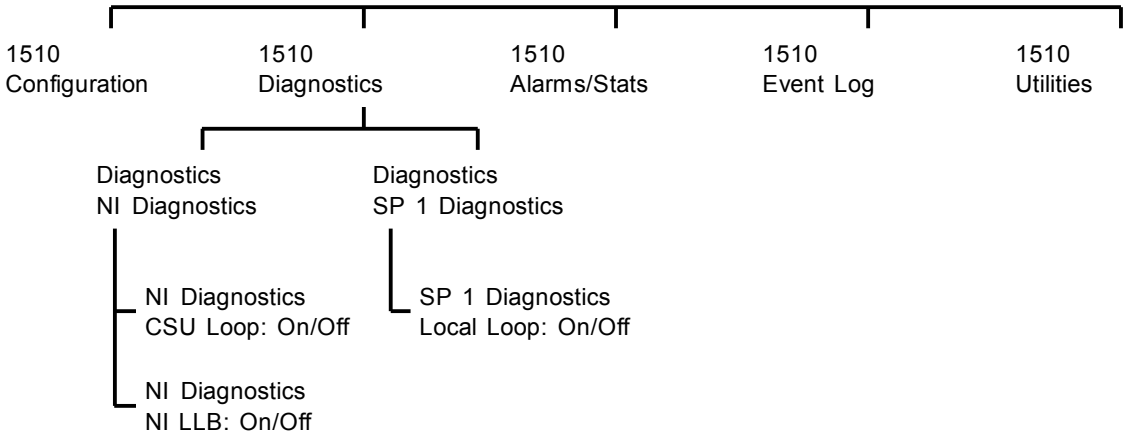
T1/FT1 CSU/DSU

Configuration Menu Tree



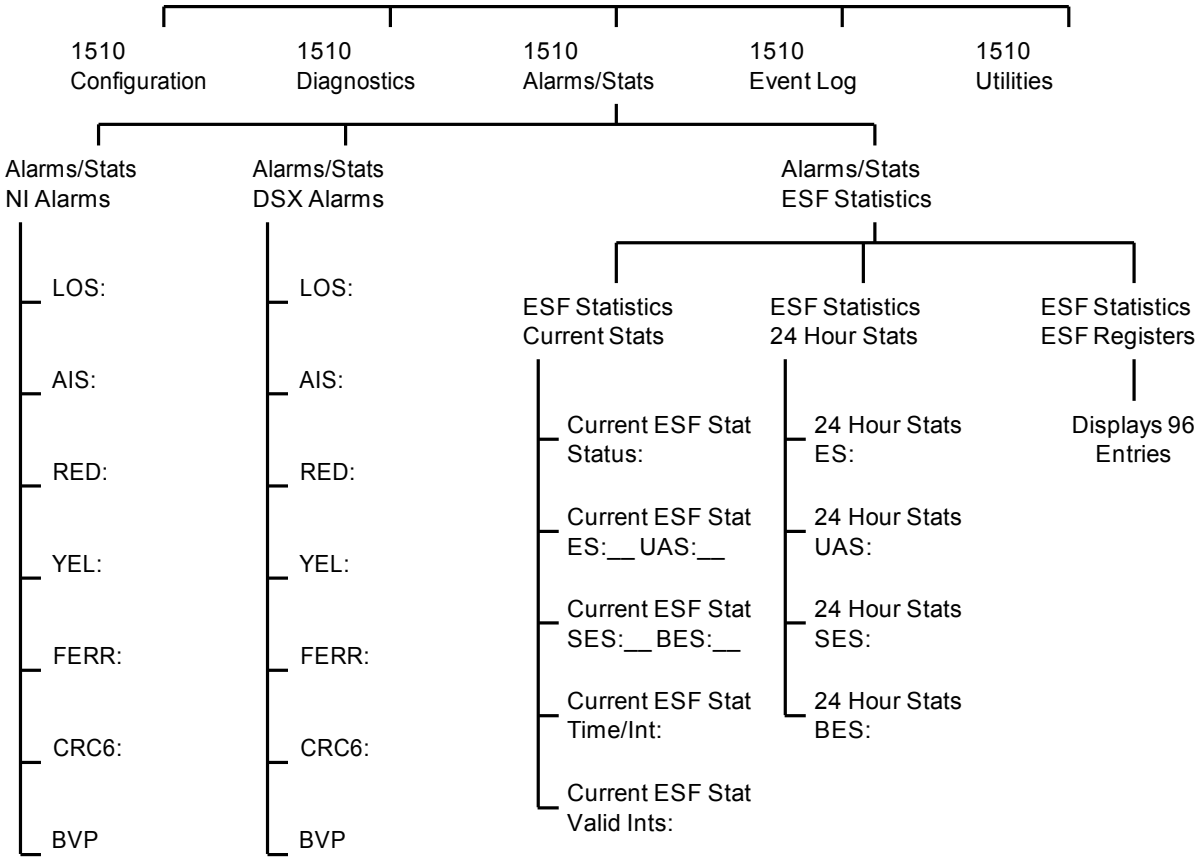
Diagnostics Menu

Tree



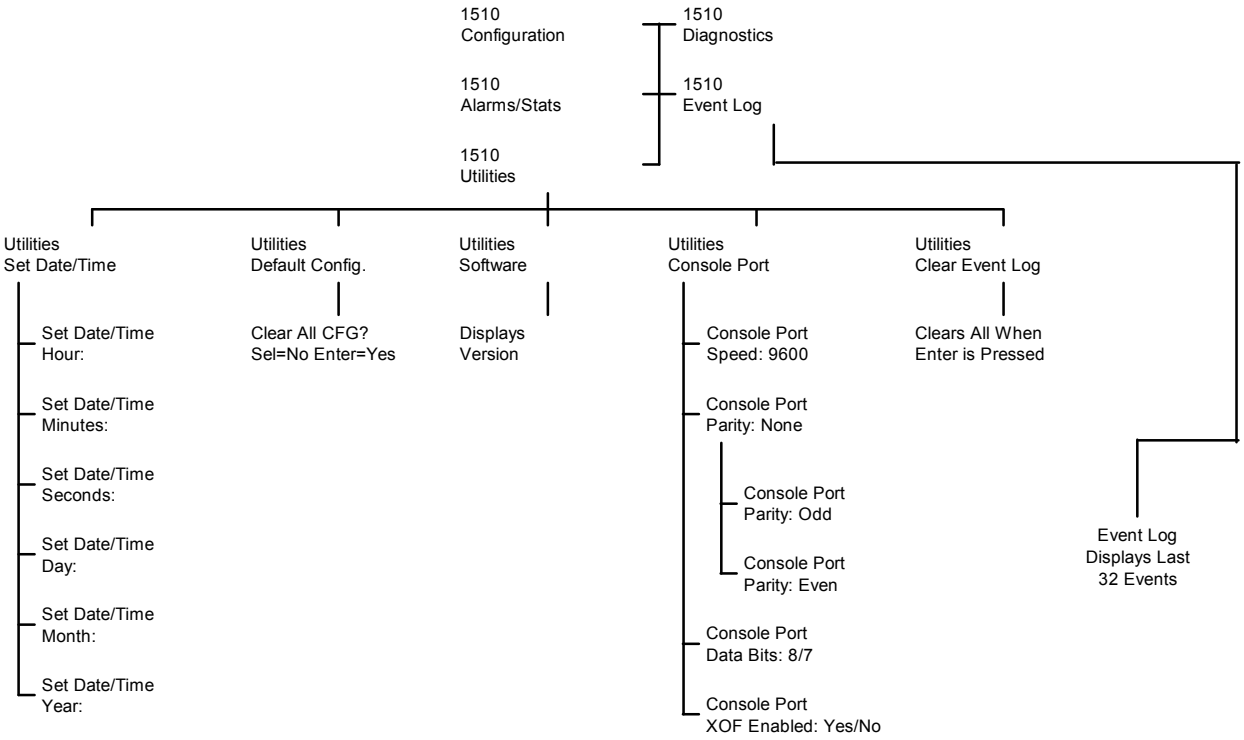
Alarm/Stats Menu

Tree



T1 Event Log and Utilities Menu

Tree



Appendix C: Glossary of Abbreviations

A	
AIS	Alarm Indication Signal
AMI	Alternate Mark Inverting
ANSI	American National Standards Institute
B	
BPV	Bipolar Violation
C	
CSU	Channel Service Unit
CTS	Clear to Send
D	
D&I	Drop and Insert
DACS	Digital Access Cross-Connect System
DSR	Data Set Ready
DSU	Data Service Unit
DTE	Data Terminal Equipment
DTR	Data Terminal Ready
H	
HDB3	High Density bipolar of order 3
L	
LAN	Local Area Network
LLB	Line Loopback
LOFS	Loss of Frame Sync
LOS	Loss of Signal
N	
NI	Network Interface
O	
OOF	Out of Frame
P	
PBX	Private Branch Exchanges
PLB	Payload Loopback
PLL	Phase Lock Loop
PRBS	Pseudo-Random Bit Sequence
R	
RAI	Remote Alarm Indicator
RTC	Real Time Clock
RTS	Request to Send
T	
TE	Terminal Equipment
TTM	Terminal Timing Mode
W	
WAN	Wide Area Network

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